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RECORD OF REVISION

Rev	Date	Description	POC	OIC
0	06/28/99	Rewritten to support LIR220-03-01, FEM, superseding Facilities Eng Standards Index and Procedures, Vol 1, Rev 7, dated 7/17/98.	Mike Nicolini, *FWO-FE*	Dennis McLain, *FWO-FE*
1	04/26/00	Added ESB to approval process, I&C Chapter; addressed SC/SS design requirements. Admin requirements changed to address the FEM and Construction Specs but not Drafting Manual.	Tobin H. Oruch, *FWO-SEM*	Mitch Harris, *FWO-SEM*
2	09/26/01	FEM now LEM; POCs now Tech Committee Chairs and AHJs; Ch 1 Tech Comm created; periodic review changed from 2 years to 3; Drafting Manual applicability restored; other minor clarifications throughout.	Tobin H. Oruch, *FWO-SEM*	Mitch Harris, *FWO-SEM*
3	05/22/02	Stds Mgr approval of specs, std details, and quals vice OIC; added AE and other non-voting committee members; clarified Ch. 1 oversight by POCs and Tech Committee; QA Rep as non-voting ESB member; org name changes.	Tobin H. Oruch, *FWO-SEM*	Kurt Beckman, *FWO-SEM*
4	11/05/03	LEM to ESM, TRB to ESB per LIR Rev 2. OIC now Chief Engineer per LIR r3. Gave AEs and contractors voting status in committees.	Tobin H. Oruch, *FWO-DO*	Gurinder Grewal, *FWO-DO*

The LANL Engineering Standards Manual (ESM), OST220-03-01-ESM, addresses requirements of LIR 220-03-01, Engineering Standards. It provides both mandatory requirements and guidance, and includes a set of standard detail drawings. The ESM also invokes two companion manuals:

- The LANL Construction Specifications Manual (LCSM), OST220-03-01-CSM, and
- The LANL Drafting Manual (DM), OST220-03-01-DM.

ESM Chapter 1 contains general material applicable to all disciplines including this section, which is an administrative procedure governing manual administration (maintenance).

BACKGROUND

The Work Smart Standards (WSS) contain provisions considered necessary to safety. Compliance with the WSS and proper maintenance will result in installations with minimal hazards, but not necessarily efficient, convenient or adequate for changing mission requirements.

The purpose of the LANL Engineering Standards Manual (ESM) is to establish a formal system to control the initiation, preparation, revision, and approval of engineering requirements relative to the national codes, standards and directives listed in the LANL contract and unique site-specific engineering criteria. The establishment of the ESM thus provides a method for LANL's compliance to the WSS and a consistent level of quality in the design, construction, and maintenance of Laboratory systems, structures, and components.

The arrangement of chapters in the LANL Engineering Standards Manual is:

No.	Discipline
1	General
2	Fire Protection
3	Civil
4	Architectural
5	Structural
6	Mechanical
7	Electrical
8	Instrumentation and Control
9	Security
10	Hazardous Process
11	Radiation Protection
12	Nuclear
13	Welding
14	Others as approved by ESB

1.0 INTRODUCTION

1.1 Purpose

This section implements a formal system to address LANL specific engineering requirements relative to the national codes, standards, and directives listed in Appendix G of the DOE/UC contract and unique site-specific engineering requirements. This section is to be maintained as part of the ESM in accordance with the LIR220-03-01, LANL Engineering Standards Manual. Use of this section ensures that:

- Site-specific engineering requirements relative to the national codes and standards listed in the LANL contract are addressed;
- Suitable national codes and standards are adopted to support safety class and safety significant design requirements;
- A formal process is implemented to control the initiation, interpretation, preparation, revision and approval of engineering requirements;
- Authority and responsibilities for the ESM are established;
- Personnel who participate in the development of ESM requirements are qualified;
- An Engineering Standards Board is established for the final acceptance of codes and standards;
- The LANL Construction Specifications Manual (LCSM) is revised commensurate with the revisions made to the ESM;
- A Drafting Manual (DM) is maintained;
- Revisions are posted on the Standards website;
- Notification and issuance of ESM revisions are made;
- Reaffirmation reviews of the ESM take place within 3 years of last revision; and
- Appropriate records are identified and retained.

1.2 Scope

1.2.1 The scope of this section includes the administrative controls for the ESM, LCSM, and Drafting Manual.

- The ESM defines the minimum engineering design requirements for structures, systems, and components at LANL. Organizations responsible for the design of LANL structures, systems, and components are responsible for ensuring that their Design Agent implements the stated requirements. This not only includes new construction, but modification of existing systems as well.
- The LCSM, as a minimum, implements and communicates the ESM technical requirements in the form of Construction Specification Institute (CSI) MasterFormat-numbered, three-part specifications for project use.
- The Drafting Manual provides requirements for facility drawings.

2.0 ACRONYMS AND DEFINITIONS

2.1 Acronyms

A/E	Architect/Engineer
AHJ	Authority Having Jurisdiction
CSI	Construction Specifications Institute
DOE	Department of Energy
FM	Facility Manager
FMU	Facility Management Unit
HSR	Health, Safety, and Radiation Protection Division
LCSM	LANL Construction Specifications Manual
ESM	LANL Engineering Standards Manual
OIC	Office of Institutional Coordination
OST	Operations Support Tool
POC	Point of Contact (ESM discipline-specific unless otherwise noted as LANL-wide)
PM	Project Management Division
PS	Performance Surety Division
QMP	Quality Management Procedure
RRES	Risk Reduction and Environmental Stewardship Division
SME	Subject Matter Expert
UC	University of California
WSS	Work Smart Standards

2.2 Definitions

Approval Authority. Approval authority refers to the person who holds a title, position, or office that can approve engineering requirement issues.

Alternate Method. A deviation from an ESM or other document that includes compensatory measures that assures the objectives of safety, constructability, operability, and maintainability.

Application Matrix. A table of codes and standards to be applied to equipment and/or technical topics based upon service classification.

Architect Engineer (A/E). The design service supplier responsible for producing design documents.

Authority Having Jurisdiction. The organization, office, or individual responsible for approving equipment, an installation, or procedure. (Ref: NFPA Fire Prevention Code Handbook, Chapter 2, First Edition, 1998). By his approval of this section of the Engineering Standards Manual, authority for their parts of the Engineering Standards is hereby delegated to the POCs by the Chief Engineer (further discussed in LIR220-03-01).

Clarify. To make the LANL Engineering Standards Manual or referenced code understandable and free from confusion through a written process.

Design Agent. The LANL organization or subcontractor (A/E) responsible for the preparation of engineering design and documentation.

Design Documents. Those documents which describe the physical configuration and design requirements of the facility. Typically these documents include calculations, drawings, and specifications.

Discipline Point of Contact (ESM POC). The LANL subject matter expert responsible for a discipline-specific chapter of the ESM and all associated specifications. There is also a POC for the Drafting Manual.

Exception. An implementation relief from all or a part of the requirements stated in the ESM or referenced code.

Industry Events. Significant events recorded and summarized in LANL Occurrence Reports and DOE Lesson Learned files or elsewhere.

Institutional Standards. The LANL Institutional Standards include those referenced in the DOE/UC LANL contract, Appendix G, called the Work Smart Standards (WSS) set; the LANL Laboratory Performance Requirements (LPRs); and the Laboratory Implementing Requirements (LIRs) that implement those WSSs.

Interpret. To provide a written, acceptable method of compliance with the ESM or referenced code.

LANL Drafting Manual. A manual that sets the criteria for drafting (graphic) conventions for creating or modifying drawings for LANL facilities construction projects and revision of those drawings. The manual number is OST220-03-01-DM.

LANL Engineering Standards Manual (ESM). A manual, arranged by discipline-specific chapters, that includes engineering requirements relative to national codes and standards listed in Appendix G of the DOE/UC contract and justifiable unique site-specific engineering requirements. The manual number is OST220-03-01-ESM.

LANL Construction Specifications Manual (LCSM). A manual that prescribes the supply, installation, and performance requirements for construction and modification projects. The manual number is OST220-03-01-CSM.

Operations Support Tool (OST). A manual or other document that contains material that supports an LPR or LIR, but is not suitable for a LIG (e.g., due to presence of requirements).

Record. Recorded information of any kind in any form maintained because it furnishes evidence of quality of items and/or activities affecting safety or compliance to specified requirements.

Subject Matter Expert. Any individual with acknowledged expertise in a given subject.

Variance. A deviation from the explicit expectations contained in the ESM or referenced code.

Work Smart Standards (WSS). The set of standards identified in the DOE/UC LANL contract, Appendix G. Also known as Institutional Standards.

3.0 RESPONSIBILITIES

3.1 Division Leaders, Program Directors, Office Directors, or their Designees

- Ensures participation by selected personnel implementing this section.

3.2 FWO Chief Engineer

- Ensures this section is properly implemented.
- Serves as Chairperson of the ESB.
- Approves revisions of the ESM as the Office of Institutional Coordination (OIC).
- Appoints special advisory committees as necessary.

3.3 FWO Standards Manager

- Manages overall standards program including schedule, budget, and resource loading.
- Collects and distributes comments and recommendations for ESM technical requirement changes to the respective technical committees.
- Works with the POCs to secure the necessary SME involvement when such needs are identified.
- Coordinates ESM issues affecting more than one technical committee.
- Serves as ESB Secretary and documents ESB decisions.
- Handles project-specific standards identification inquiries.
- Serves as POC for ESM Chapter 1.
- Oversees webposting and recordkeeping of approved documents.
- Maintains a Quality Assurance Plan for the program/process.

3.4 Discipline Point of Contact (POC)

- Functions as the technical committee Chair.
- Sets the technical committees agenda and meeting schedules.
- Performs as the senior technical lead within the respective technical committee.
- Works with the Standards Manager to secure the necessary SME involvement when such needs are identified.
- Responds to requests for clarification, interpretation, variance, and exception to ESM/LCSM/DM requirements.
- Identifies cross-references between ESM requirements that could be affected by the proposed technical requirement changes.
- Identifies and prepares changes to the LCSM and Standard Details resulting from ESM technical requirement changes.
- Documents the technical committee recommendations.

- Prepares ESM technical requirement changes for ESM incorporation.
- Presents proposed ESM changes to the ESB.
- Depending upon the subject matter, the POC may also be the AHJ (in accordance with LIR220-03-01, Engineering Standards).

3.5 Technical Committee Members and Alternates

- Participates in technical committee meetings.
- Ensures that recommended changes to the ESM and LCSM are technically reviewed in a prompt manner when requested.
- Interacts with other technical committee members and Subject Matter Experts (SMEs) for determination of ESM requirements/guidance.
- Documents comments, recommendations, and technical bases regarding ESM requirements.

3.6 Subject Matter Expert (SME)

- Advises POC in specific areas of expertise.
- If requested, provides independent review of proposed ESM technical requirement changes.
- Provides technical recommendation for or against proposed ESM technical requirement changes.
- Supports and participates in the technical committee meetings as requested by the POC.

3.7 Engineering Standards Board (ESB) Members and Alternates

- Considers the overall potential impact of ESM technical requirement changes on LANL mission and performance goals.
- Performs final review and approval of proposed technical requirement changes to the ESM.

3.8 Quality Assurance Representative

- Performs QA reviews of any material promulgated for or affecting safety-related work (ML-1, ML-2, SC, SS*) (typically the ESM but not specifications or Drafting Manual),* and any program documents addressing quality such as the QA Plan. A non-voting member of the ESB.

3.9 Administrative Assistant/Program Admin

- Performs editing and assists with review, archiving, and webposting processes.

4.0 PROCEDURAL STEPS

4.1 Background

4.1.1 This section provides for the selection, review and revision of technical requirements to be applied in the development of new LANL systems and the maintenance and modification of existing systems.

4.1.2 These requirements are consolidated, by discipline, into respective chapters of the ESM. The sources for these requirements include the WSS, Appendix G of the DOE/UC contract, existing codes and standards from previous facility project baselines, proposed codes and standards from new facility projects, and requested changes resulting from facility maintenance and modification activities. The establishment of the ESM thus provides a method for LANL's compliance to the WSS and a consistent level of quality in the design, construction and maintenance of Laboratory facilities.

4.1.3 The LCSM is developed following the latest CSI MasterFormat for project and maintenance modification use and, as a minimum, promulgates the ESM technical requirements and provides a consistent and uniform means to develop project specifications.

4.1.4 The LANL Drafting Manual is maintained in a manner similar to the ESM Discipline chapters. When drafting work is within its scope description, its use is required.

4.2 Methodology

4.2.1 The process of selection, review, and approval of technical requirements for inclusion into the ESM utilizes the concepts of:

- a Standards Manager for overall program management and coordination
- single-point contacts (POCs) for each discipline (e.g., Mechanical, Civil, Electrical, etc.)
- technical committees of technically competent individuals assigned per discipline representing experience and diverse backgrounds (e.g., HSR, PM, PS, RRES, and FWO including the FMUs)
- subject matter experts on an as-needed basis
- an ESB to conduct a final review and approval of changes to the ESM

4.2.2 This section ensures that appropriate technical requirements are identified and integrated into the ESM as they are needed. This section also requires formal change control for controlling ESM revisions.

4.2.3 The process is summarized as follows:

- Technical requirement inputs, such as specified by WSS, capture of existing facility codes and standards, new facility project requirements, and requested changes resulting from facility maintenance and/or modification activity requirements are collected by the Standards Manager and forwarded to the respective POC.
- Furthermore, when technical requirements are recognized to support compliance with safety class and safety significant design requirements, these relationships are documented in the ESM.

- The POC convenes meetings of the technical committees as appropriate to review proposed changes to the ESM and documents those recommendations.
- As necessary, the technical committee through the POC may request input from one or more SMEs to aid in preparation of the technical requirement recommendations.
- Broader review by the Lab (e.g., via POC@lanl.gov and FM listserves) is required when requirements on programs (vs. facilities) are involved, and is recommended at all times.

4.2.4 When requested by the POC, the Standards Manager arranges for the presentation of the recommended ESM changes to the ESB for final approval. The ESB, upon completion of the review, may accept or reject the recommendation. If rejected, the technical requirement recommendation is returned to the responsible technical committee for resolution. If accepted, the POC prepares the section for incorporation into the ESM. Refer to Attachment 1, ESM Manual Administration Flow Diagram.

4.2.5 Issues such as clarifications and interpretations may be directly responded to by the POC.

4.2.6 Revisions to the LCSM, Drafting Manual, and ESM Standard Details are administratively controlled in an identical fashion to the ESM with the exception that the LCSM and Standard Detail revisions do not require ESB approval; Standards Manager approval is sufficient for these implementing documents. Similarly, administrative changes that do not increase the cost or impact or requirements can be made with the approval of the Standards Manager. Examples include grammatical and other error corrections, clarifications, organizational name changes, etc. These can be issued as a new revision or as a Change (e.g., Chg 1) to a revision.

4.2.7 Under no circumstances shall the LSCM be revised to conflict or take exception to the ESM.

4.3 Selection of Key Standards Program Personnel

4.3.1 The technical committees, ESB, POCs, and SMEs are selected such that the composition of individuals and requisite expertise results in a broad representation of technical disciplines and subject areas. The technical committees are to be composed of knowledgeable individuals from the various stakeholder organizations. The following membership is recommended, as a minimum:

- **Point of Contact (ESM Discipline POC)**

  The OIC appoints a POC knowledgeable in the respective discipline area. The POC is the senior technical expert on the technical committee. The POC is ideally a prime contractor (e.g., UC) employee with a minimum of 10 years experience. For most chapters a registered professional engineer or architect is preferred (exceptions include General and Radiation Protection). The qualifications of each POC shall be documented using Appendix B, “ESM Personnel Qualification Record.”

- **Technical Committee and Alternates**

  Nominally has broad representation (e.g., FWO including DECS, MSE, and FMUs; PM, PS, RRES, HSR) knowledgeable in the respective discipline area and meeting the qualification requirements specified in Appendix B, "ESM Personnel Qualification Record" and documented using same. Membership is subject to approval by the POC. AE firms are encouraged to participate. Those not meeting the 5-year experience requirement of Appendix B have non-voting status. Each technical committee is organized and run by the Discipline POC. *The Chapter 1 committee should include field personnel with CM experience and POCs for equipment-related disciplines (Mechanical, Electrical, and I&C). Chapter 1 Sections 100 and 110 revisions should only be reviewed by the POCs.*

- **ESB and Alternates**

  The ESB is chaired by the Chief Engineer and nominally includes Group and Division Leaders from the following organizations: FWO-DECS (both DE and CS aspects), FWO-MSE, FMs, Ops Council, HSR, PM, PS, FWO-FIRE, FWO-UI, and RRES (they are assumed qualified by virtue of their positions). The QA Representative is a non-voting member of the ESB. The ESB members and alternates shall be independent of the technical committees and SMEs to the extent possible; Tech Committee personnel acting as an ESB member/alternate shall abstain from voting on that committee's recommendations to avoid a conflict of interest.

- **Standards Manager**

  The Chief Engineer appoints a Standards Manager, ideally, an engineer or architect having over 10 years experience in the use of codes and standards. The qualifications of the Standards Manager are documented using the format in Appendix B. He may be assisted by a Standards Engineer, Architect, or Coordinator who, if delegated authority, shall meet the same qualifications.

- **SMEs**

  SMEs are called upon at large by POCs for their expertise on a particular subject, meeting the qualification requirements specified in Appendix B, ESM Personnel Qualification Record and documented with same.

4.4 Review, Acceptance, and Approval of Proposed ESM Requirement Changes

4.4.1 Technical change requests may be presented as

1. WSS-driven,
2. New project-related requirements,
3. Capture of existing facility requirements,
4. Proposed alternate methods, and/or
5. Industry events and lessons learned.

4.4.2 *Input from industry events should be evaluated periodically for impact to the ESM. LANL Occurrence Reports, DOE Lesson Learned, and Issues Tracking I-Track system should be reviewed by the Standards Manager on a quarterly basis for potential input into the maintenance of the ESM.*

4.4.3 The technical committee convenes as requested by the POC (*should also invite the Standards Manager*) and reviews the changes provided by the POC for consideration into the ESM. The POC documents their review and provides a written technical evaluation and recommendation for incorporation into the ESM or basis for rejection. This review is to:

1. Determine if incorporation of the technical requirement is necessary and prudent to achieve compliance to the WSS;
2. Ensure a level of quality and consistency in the design, construction and maintenance of LANL facilities; and
3. Capture existing facility technical requirements not presently in the ESM but, based on the review, should be.

Additional factors such as life-cycle costs associated with a technical requirement change, associated impacts to other disciplines, environmental impact, and compliance issues pertaining to nuclear safety class and safety significant requirements should also be considered.

The basis (justification) for all new or revised requirements and guidance in the ESM not immediately obvious to the untrained shall be captured in an endnote, especially those technical requirements implementing Federal/State mandates or commitments made to regulatory agencies as the result of inspections, audits, or accident investigations. *Bases for LCSM and Standard Detail requirements should be filed in the LCSM files. Spec bases can also be captured in author notes.*

Appendix C, ESM Change Proposal, should be used to document the technical committee review, evaluation, and technical requirement change recommendation.

4.4.4 A majority of active technical committee members or alternates is required to proceed with a technical requirement change. The technical committee bases decisions upon simple majority rule with ties broken by the Chair. Non-voting members and SMEs have an advisory capacity and cannot vote on technical committee decisions.

4.4.5 Per LIR 220-03-01, programmatic requirements must receive consensus approval of LANL POCs prior to issuance (they must also be specifically identified in the Manuals as programmatic). *Such labwide review is recommended for all substantial ESM changes regardless of programmatic impact.*

4.4.6 Based on the review outcome, the POC either returns the rejected technical requirement change back to the originator with explanation or presents the draft revised section to the ESB for approval in coordination with the Standards Manager.

4.4.7 The ESB, as requested by the respective POC via the Standards Manager, convenes to accept or reject the technical requirement recommendations. The ESB decision is documented on Appendix D, ESM ESB Meeting Attendance and Voting Record. The quorum for the ESB to convene is a minimum of five (5) members. The ESB decision for acceptance/rejection is by simple majority rule and is to be based on the same factors given above, along with any considerations for long-term, broad-based impact to LANL mission and performance goals. Rejections are to be returned to the respective technical committee for resolution.

4.4.8 If accepted by the ESB, the POC works closely with the Standards Manager to prepare the technical requirement change into the proper format for incorporation into the ESM, and submit the ESM revision to the ESB Chairman for approval signature via Appendix A. As the ESB Chairperson, the OIC signs as "Approved" for the ESM revision.

4.4.9 Changes to the LCSM and Standard Details resulting from the proposed ESM technical requirement change shall be identified by the POC. *These should be forwarded to the respective technical committee for review prior to optional, broader review*. Approval of POC and Standards Manager shall be documented on Appendix A and filed.

4.5 Interpretations and Clarifications

4.5.1 Manual users shall submit requests in writing to the appropriate POC if a written response is desired. E-mail links on the Standards webpages shall be maintained to facilitate easy communication with the POCs.

4.5.2 When interpretation or clarification e-mails or paper requests reach the appropriate POC(s), they shall be responded to promptly and in writing.

4.5.3 The POC for each respective technical committee may respond immediately to interpretations and clarifications, or first call upon the assistance of the respective technical committee. *Responses should be copied to the Tech Committee and ESM Standards Manager.*

4.5.4 *Interpretations and clarifications of general interest to LANL should be documented using Appendix E or similar format and posted on the Standards website via the Standards Manager.*

NOTE: See Table 100-1 for summary of clarification and variance processes.

4.6 Variances and Exceptions

4.6.1 Variances and exceptions to the ESM proper are outside the scope of this section and shall be processed in accordance with LIR301-00-02, "Variances and Exceptions to Laboratory Operations Requirements" and LIR 220-93-01, Engineering Standards.

4.6.2 Exceptions to the LCSM, Drafting Manual, Standard Details (ST drawings), and welding procedures may be granted in writing by the discipline POC in a manner similar to the interpretation process described above (i.e., without following LIR301-00-02).

4.6.3 Variances and exceptions are intended for future work. When work has proceeded in violation of the Engineering Standards, a nonconformance report (NCR) is the appropriate document for dispositioning the situation and shall be submitted by the petitioner. Project Management Div procedure 0313, Nonconformance Reporting, *can be used when more appropriate procedures/forms do not exist.*

4.6.4 *All general-interest (non-project-specific) variance and exception data should be posted for viewing on the LANL web until such time the exception or variance no longer physically exists, or the ESM is revised to incorporate the exception or variance. Project-specific variance and exception data should also be posted (postings may be via PS-Operations Integration "Requirements" homepage).*

4.6.5 *Exceptions or variance dispositions for planned incorporation into the ESM should indicate such plans in the web posting.*

TABLE 100-1, Clarification/Alternate/Variance Approval Levels

	LANL Construction Spec, Drafting Manual, or Standard Detail		LANL Engineering Standards Manual		Work Smart Standard	
	Approve/Issue	**Appeal**	**Approve/Issue**	**Review/Appeal**	**Approve/Issue**	**Appeal**
Clarification or Interpretation	ESM Discipline POC	ESM Discipline technical committee or Standards Mgr	ESM Discipline POC	ESM Discipline technical committee	AHJ	Lab Director appointed AHJ or ESM Technical committee
Alternate Method	ESM Discipline POC	ESM Discipline technical committee or Standards Mgr	ESM Discipline POC	ESM Discipline technical committee or Standards Mgr	LD-appointed AHJ or ESM Technical committee	Laboratory Director
Variance or Exception	ESM Discipline POC	ESM Discipline technical committee or Standards Mgr	LIR301-00-02	Lab Director (LD)	DOE LASO	DOE HQ

4.7 Manual Distribution and Control

4.7.1 The ESM Standards Manager ensures that the revised ESM, LCSM, or Drafting Manual section is posted on the Standards webpage within 10 working days of approval and then issues an electronic memo notifying all organization users of the revised manuals within 30 days of webposting. *This is typically done monthly via e-mail to POC@lanl.gov, FMs, PM, KSL, and an additional list of those specifically requested such notification.*

4.7.2 *LIR220-03-01, Engineering Standards, has implementation requirements for projects and new requirements.*

4.8 Assessments

4.8.1 Assessments shall be performed as scheduled by the AA-2 Auditing Group and/or the OIC.

4.8.2 Feedback or improvement suggestions regarding this section can be made via e-mail link on the website.

5.0 REQUIRED RECORDS

5.1 Responsibilities

5.1.1 The Standards Manager shall ensure electronic, back up, and hardcopy files of the ESM, LCSM, and Drafting Manuals are maintained.

5.1.2 The following documents shall be maintained:

- ESM Personnel Qualification Records
- ESM Change Proposals
- ESM ESB Meeting Attendance and Voting Record

6.0 CHAPTER FORMAT

For format matters see ESM Chapter 1, Section 110, ESM Writer's Guide.

7.0 REFERENCES

- LPR220-03-00, Facility Projects -- Engineering Design
- LPR220-05-00, Facility Projects – Project Execution
- LPR220-06-00, Life Cycle Asset Management – Project Management and Asset Acquisition
- LIR220-03-01.1, LANL Engineering Standards Manual
- LIR301-00-02, Variances and Exceptions to Laboratory Operations Requirements
- OST220-03-01-CSM, LANL Construction Specifications Manual
- OST220-03-01-DM, LANL Drafting Manual

8.0 APPENDICES

Appendix A: ESM Signature Sheet

Appendix B: ESM Personnel Qualification Record

Appendix C: ESM Change Proposal

Appendix D: ESM ESB Meeting Attendance and Voting Record

Appendix E: ESM Clarification/Interpretation/Variance Request

9.0 ATTACHMENTS

Attachment 1: Manual Administration Flow Diagram *(print 11 x 17)*

Existing Facility "Committed to" Codes & Standards

UC Contract Appendix G

Work Smart Standards

Feedback/Interaction

New/Major Projects

Chapter 1

Gen Eng Tech Com
- POC/Chairperson
- FMU
- PMD
- FWO

SME(s)

Manual Admin
SystemLists
System Boundaries
Component IDs
Labeling

- Review
- Interpret
- Clarify
- Prepare

ESM Changes
- Document

Chapter 2

Fire Prot Tech Com
- POC/Chairperson
- FMU
- PMD
- FWO

SME(s)

Fire Hazard Analysis
Sprinklers
Hydrants
Life Safety
Fire Detection Systems
Fire Signaling Systems
Fire Extinguishers

- Review
- Interpret
- Clarify
- Prepare

ESM Changes
- Document

Chapter 3

Civil Team Tech Com
- POC/Chair
- FMU
- PMD
- FWO

SME(s)

Soils
Sewer
Water Treatment
Water Drainage
Radiation shielding
Roadways
Utilities

- Review
- Interpret
- Clarify
- Prepare

ESM Changes
- Document

Chapter 4

Arch Tech Com
- POC/Chair
- FMU
- PMD
- FWO

SME(s)

Security Design
Roofs
Doors
Paint & coating
Sealants
Penetrations
Irrigation
ADA

- Review
- Interpret
- Clarify
- Prepare

ESM Changes
- Document

Chapter 5

Struct Tech Com
- POC/ Chairperson
- FMU
- PMD
- FWO

SME(s)

Concrete
Structure Steel
Piping supports
Seismic
Cranes & Hoists
Critical load paths

- Review
- Interpret
- Clarify
- Prepare

ESM Changes
- Document

Chapter 6

Mech Tech Com
- POC/Chair
- ESH
- FMU
- PMD
- FWO

SME(s)

Boilers
Pumps
Valves
Compressors
Piping
Heat Exchangers
HVAC
Air Cleaning Devices
Cooling Towers
Lubrication
Chillers
Service Gases
Pressure Vessels
Corrosion

- Review
- Interpret
- Clarify
- Prepare

ESM Changes
- Document

Chapter 7

Electrical Tech Com
- POC/ Chairperson
- ESH
- FMU
- PMD
- FWO

SME(s)

Batteries
Motors
Transformers
Distribution
Standby Power
UPS
Breakers
Power Quality
Cathodic Protection
Switchgear
Cable & Raceway
Lighting
Lightning Protection
Utilities

- Review
- Interpret
- Clarify
- Prepare

ESM Changes
- Document

Chapter 8

I&C Tech Com
- POC/ Chairperson
- FMU
- PMD
- FWO

SME(s)

Communication
Human factors
Digital Controls
Pneumatic Controls
PLCs
Rad Monitoring
Remote signaling

- Review
- Interpret
- Clarify
- Prepare

ESM Changes
- Document

Engineering Stds Board

Reject

Reject

Accept

Eng Stds Board
- ESH
- RRESD-PP
- Chief Engr (Chairperson)
- FWO-FIRE
- FMU Representative
- FWO-UI
- PM
- FWO-DECS
- FWO-MSE
- Ops Council Rep

LANL Engineering Stds Manual

Notes:

Technical Committee Quorum is 3
Technical Review Board Quorum is 5

LANL	FACILITY AND WASTE OPERATIONS ENGINEERING STANDARDS
Title: LANL Eng Standards Manual Chapter 1 Attachment 1 ESM Flow Diagram	*Date:* 11/5/03
	Sheet 1 of 1
Preparer: N. Hoadley	*Reviewer:* T. Oruch
File: ch1_att_1_flowchart_r2.vsd	

APPENDIX A
SIGNATURE SHEET FORMAT

SIGNATURE SHEET

Submitted by: _____ _____
Name of Discipline POC *Date*

Reviewed by: _____ _____
XXXXX XXXXX, Engineering Standards Manager *Date*

QA Concurrence: _____ _____
XXX XXXXXX, FWO QA Representative *Date*

Approved by: _____ _____
XXXX XXXX Chief Engineer; OIC & Eng Standards Board *Date*

Reason for Revision/New:

APPENDIX B

Name:

Position Title: Various

General Requirements:

Personnel performing functions as Technical Committee members, POCs, and SMEs should understand the technical aspects of nuclear and non-nuclear facility designs, including the LANL technical missions, and hazards associated with the LANL mission activities. Personnel shall be capable of discharging the procedural responsibilities with the specific goal of performing technical reviews and judgements in regard to technical requirement changes to the ESM. [Ref. Engineering Standards Manual]

Minimum Qualifications:

Commensurate with the discipline (chapter) involved, personnel working within the ESM procedure shall hold a bachelor or advanced degree in an engineering, physical science field, or an equivalent combination of work experience and education, and shall have a minimum of five (5) years technical experience in one or more areas listed as follows:

a) Nuclear and/or non-nuclear industrial facility design, construction, or operations

b) Application of a recognized engineering discipline (mechanical, electrical, nuclear, instrumentation and control, etc.)

c) Application of system engineering, including the monitoring, maintenance or operation of nuclear and/or non-nuclear industrial facilities

I have evaluated the qualifications of: _____[name/date], or attached list of ESM personnel having resumes on file and certify that this individual's education and experience are commensurate with the requirements specified within this form for the expressed purpose for working in accordance with the above referenced procedure.

Standards Manager: _____ Date: _____

Print name/signature

APPENDIX C

Technical Discipline:
Technical Requirement Change Description:
Work Smart Standard:
LANL Facility(s):
Facility Life Cycle, Constructions Specifications, or other considerations:
Technical Evaluation:
Recommendation: **Technical Committee POC:** _____ **Date:** _____ Print name/signature **Standards Manager:** _____ **Date:** _____ Print name/signature

APPENDIX D

ESB Meeting Attendance and Voting Record

Date _____

Quorum=5

Voting

Initial under "Yea" or "Nea;" motions 1-4 below

ESB Members	Initial if Present	Alternates	Initial if Present	Org	1 Y	1 N	2 Y	2 N	3 Y	3 N	4 Y	4 N
				FWO-DECS								
				HSR								
				RRES								
				FWO-FIRE								
				FMC								
				FWO-UI								
				PS								
				PM								
				FWO-DECS-CS								
POCs				**VOTE TOTALS**								
				PASS (P) FAIL (F)								
Other Attendees												
1												
2												
3												
4												
5												
6												
7												

Motion Descriptions

1 _____

2 _____

3 _____

4 _____

Appendix E

Standard Document/Chapter/Section: **Technical Discipline:**
Petitioner:
Inquiry:
Existing wording:
Clarification ___ **Interpretation** ___ **Variance** ___
Technical Committee POC: _____ **Date:** _____ Print/Signature
Distribution (via e-mail): **Petitioner:** _____ **Standards Manager:** _____